Types of Dredges

There are three main types of dredges—mechanical, airlift, and hydraulic—and various factors must be considered when deciding which type of dredge to use. For example, what type of material needs to be dredged? What is the location of this material? And is the material contaminated? The type of dredge needed depends upon the size and consistency of the sediment.

Mechanical Dredges

Mechanical dredges use a bucket-like apparatus to scoop up material and dump it either on a temporary barge or directly onto a disposal site. They can work in confined areas, such as small harbors or around docks and piers, and they are most suited to removing hard-packed sediment. A mechanical dredge easily removes large pieces of rock, but fine sediment tends to wash out of the bucket as it is being raised through the water. Clam shell dredges and dipper dredges are the most common types of mechanical dredges.

Clam shell dredge in New York Harbor (lower left) and a close-up of material disposal (upper right).
Courtesy: U.S. Army Corps of Engineers

Airlift Dredges

Airlift dredges use hydrostatic pressure to raise material off the bottom into a piston-like cylinder. Once the cylinder is full of sediment, compressed air pushes the material through a pipe to a temporary barge or a disposal site. Airlift dredges are not commonly used in the U.S., but they are well-suited for removing contaminated sediments, since very little water mixes with the dredged sediments.

Hydraulic Dredges

Hydraulic dredges function much like a vacuum, sucking up a mixture of bottom sediment and water. These dredges are not usually suitable for the removal of contaminated sediment where dissolved chemicals could easily spread into the environment at the disposal site. There are two main types of hydraulic dredges: pipeline and hopper.

A half-filled hopper dredge in New York Harbor (upper left) and a close-up of a dredge's hydraulic arm (lower right).
Courtesy: U.S. Army Corps of Engineers

Pipeline dredges consist of a pipeline attached to a dredge, which pumps bottom material from the intake pipe directly to the disposal site. This type of system is often used for beach nourishment projects when the dredged material can be pumped directly onto the beach. The intake pipe may be equipped with sharp rotating blades to break up large pieces of sediment during the dredging process. This type of dredge, called a cutterhead pipeline dredge, is able to break up and remove rock.

Hopper dredges are simply ships with storage areas connected to the intake pipe. Dredged material is pumped into the storage area and, once the sediment settles, excess water is released back into the ocean.

For more information on dredging and disposal of marine sediments, please visit the U.S. Army Corps of Engineers' on-line educational resources. *http://education.usace.army.mil/*